Near-infrared data of X-ray sources from the Galactic Bulge Survey

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Outline

- Galactic Bulge Survey (GBS)
- VISTA Variables in the Via Lactea (VVV)
- Cross-matching GBS and VVV

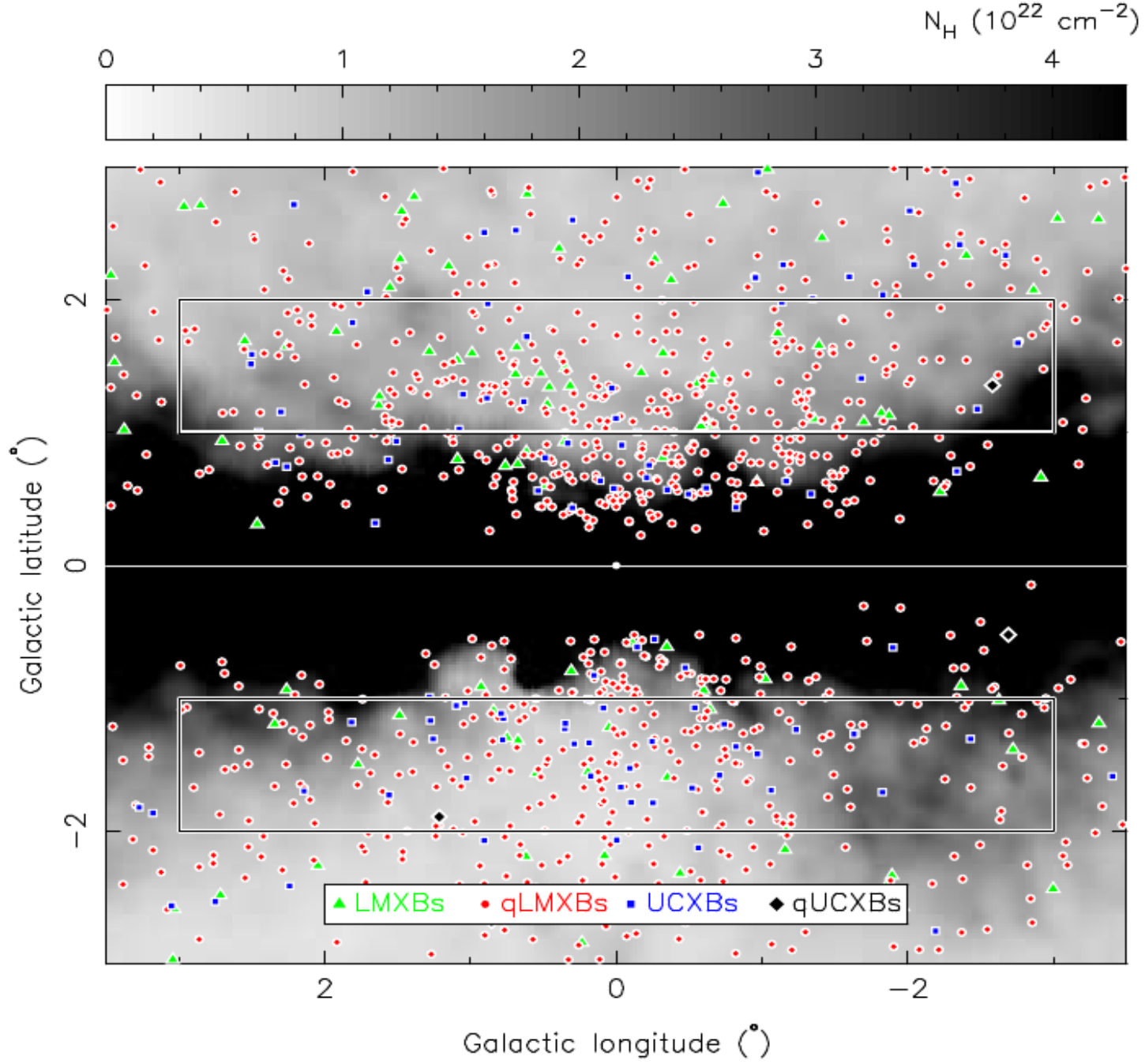
The Chandra Galactic Bulge Survey
(P. Jonker et al., 2011)

- Main goals :
  - Determine accurate masses of rare XRBs
  - Study binary formation and evolution
  - Select binary candidates for optical spectroscopy
- Chandra + optical (r, i, Hα) imaging of two strips 6^o x 1^o
- Variability survey

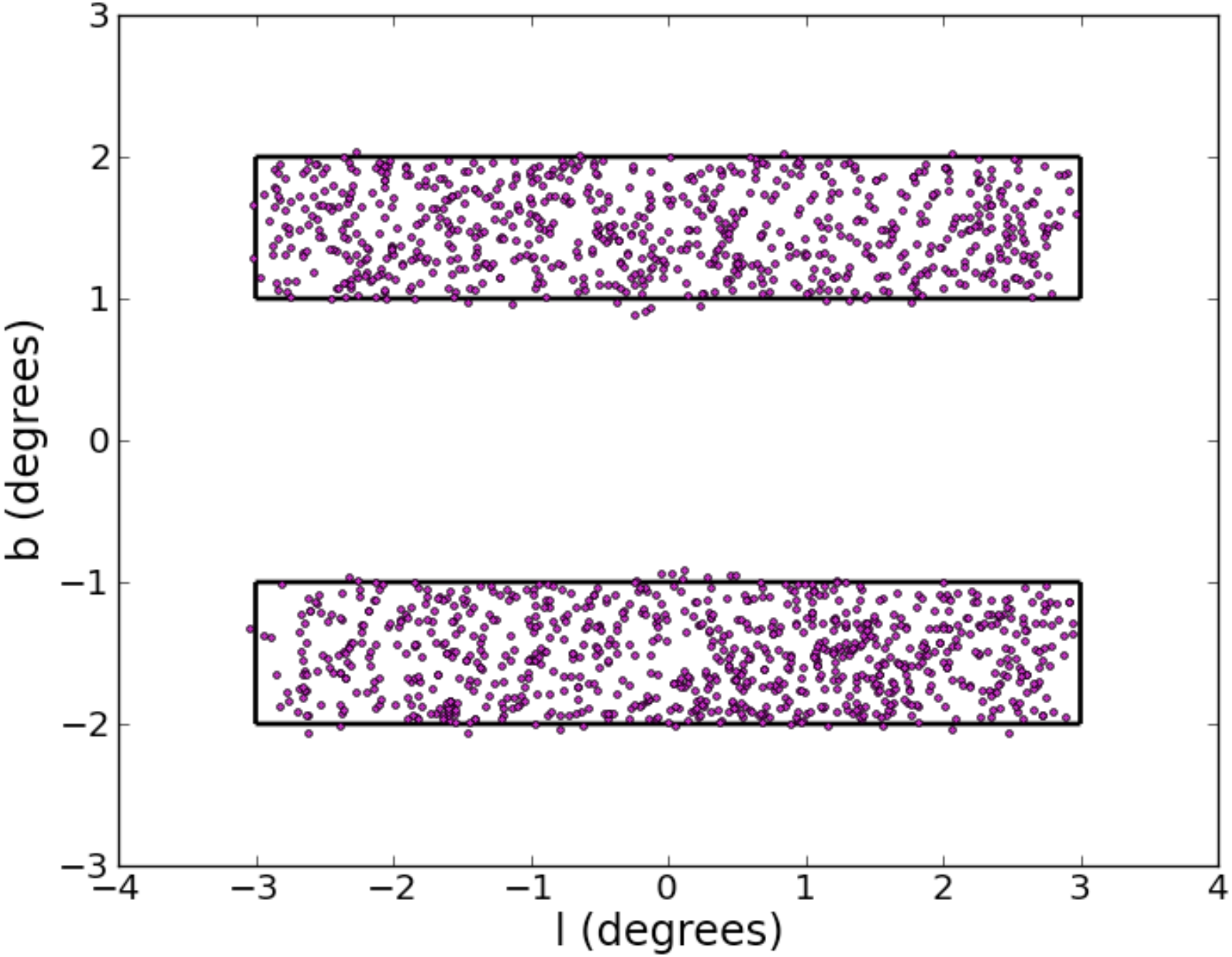
Simulation of X-ray Binaries Population (G. Nelemans)

High extinction
+
high density

We need multi-wavelength data

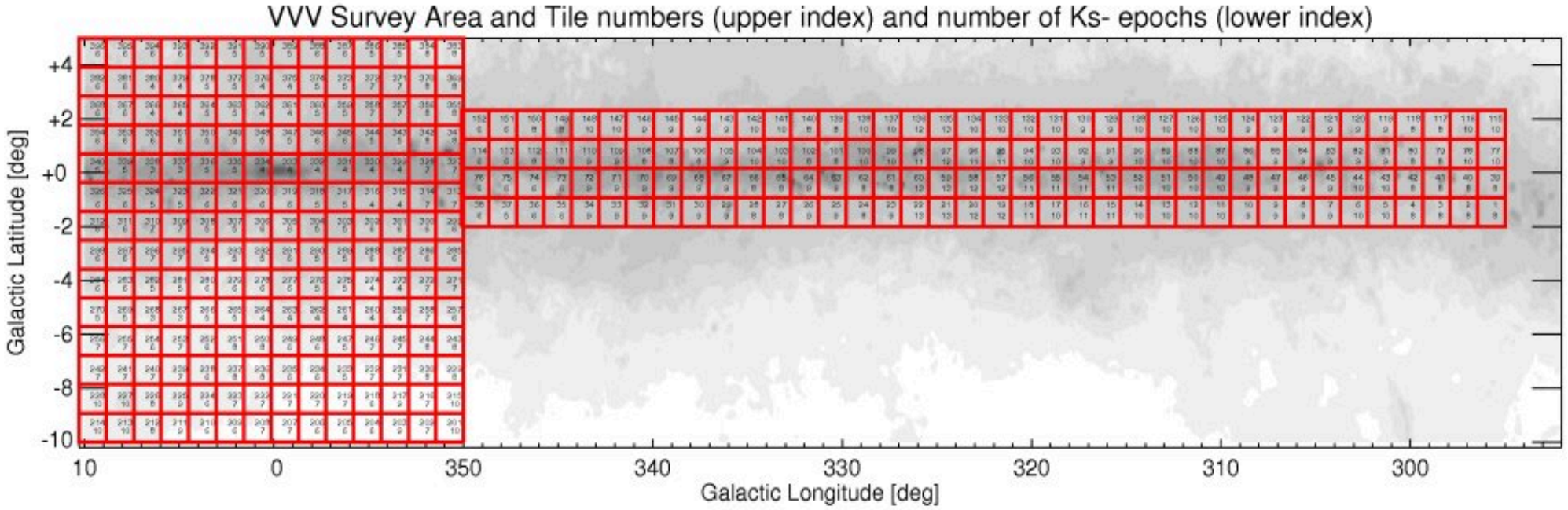


1650 unique X-ray sources detected by Chandra



VISTA Variable in the Via Lactea (VVV) (Minniti et al., 2010)

- Main goal: construct a 3-D map of the surveyed region by using variable stars
- Total area covered: 520 deg^2 of the Galactic bulge and plane: 300 deg^2 of the Bulge + 220 deg^2 of the Plane



- Observations: service mode with VIRCAM on VISTA
- Broad-band filters used: Z Y J H Ks
- VVV overlaps with GBS ➔ used to get NIR data of the GBS sources

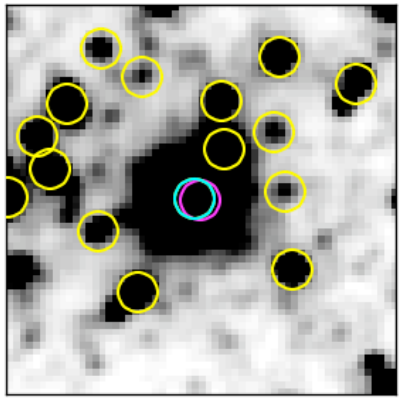
Cross-matching GBS and VVV

- Search for all J, H and Ks matches in VVV within 5” of X-ray position
- Band-merge VVV catalogs
- VVV catalogs do not always have the same matches in J, H and Ks

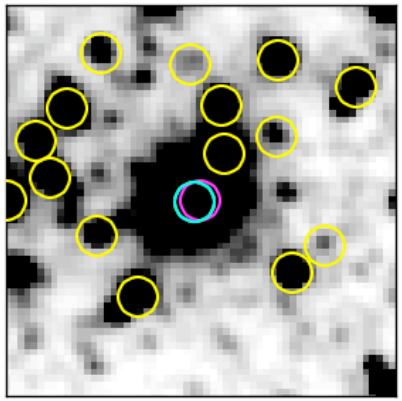
VVV J-band	VVV H-band	VVV Ks-band	MOSAIC (Optical)
1646	1646	1646	1034
99.8%	99.8%	99.8%	63%

CX0009

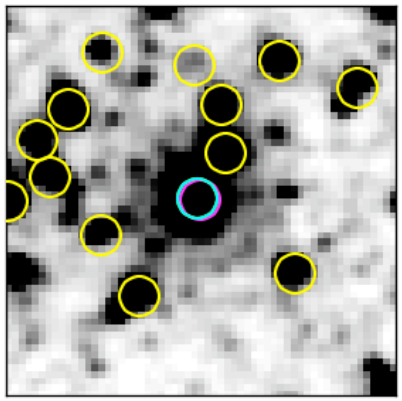
Close-up of 20" x 20" in J-band



Close-up of 20" x 20" in H-band



Close-up of 20" x 20" in Ks-band



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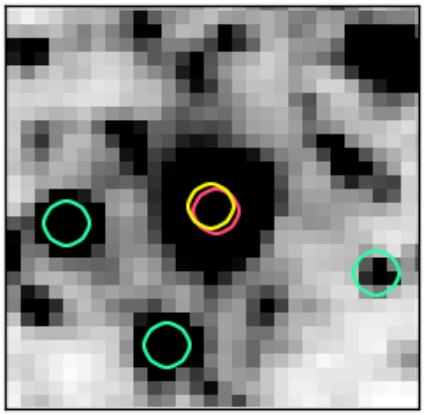
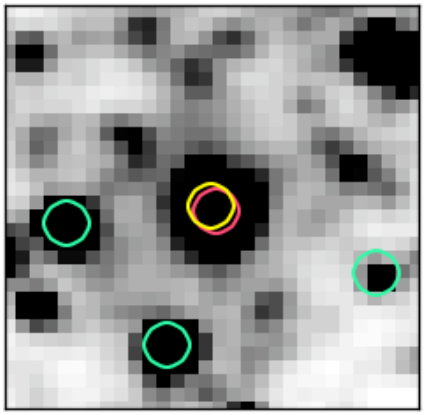
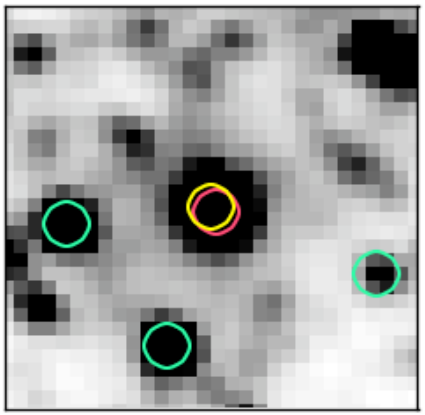


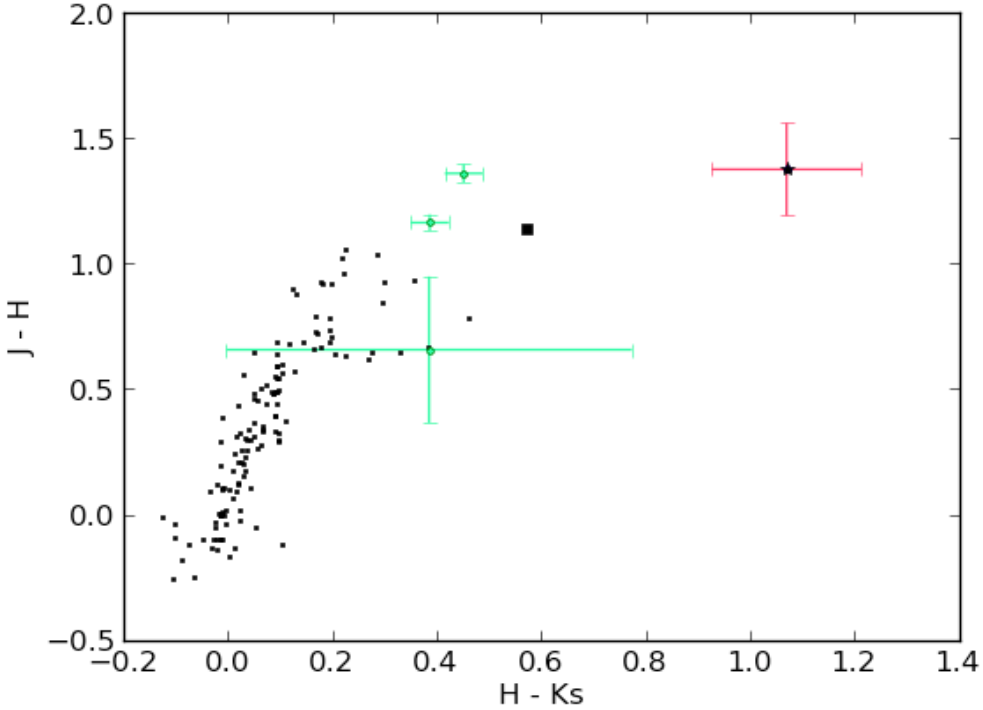
Ks-band

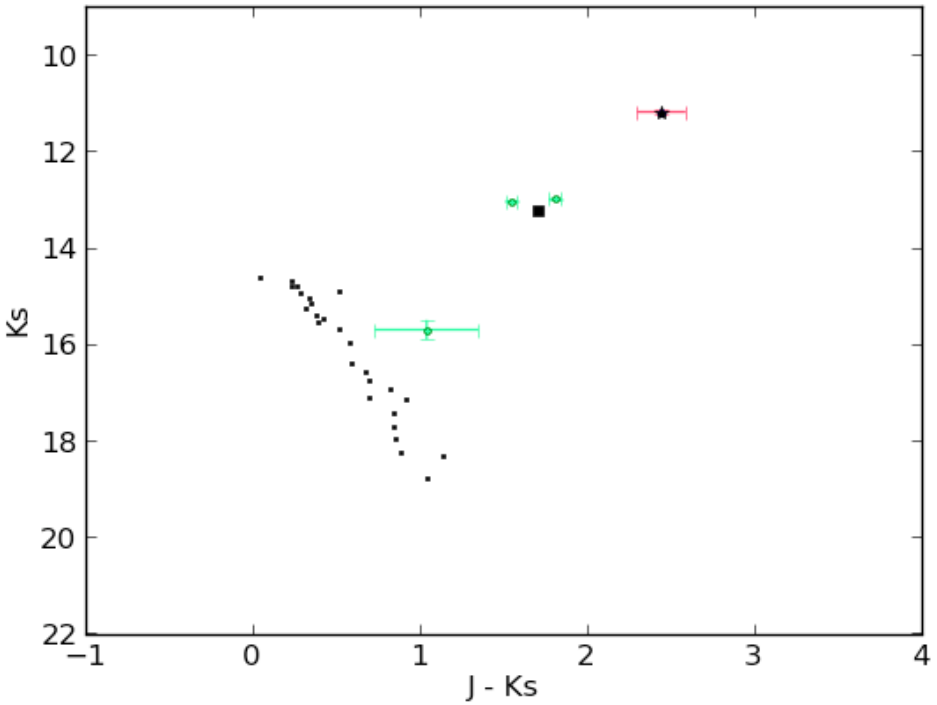


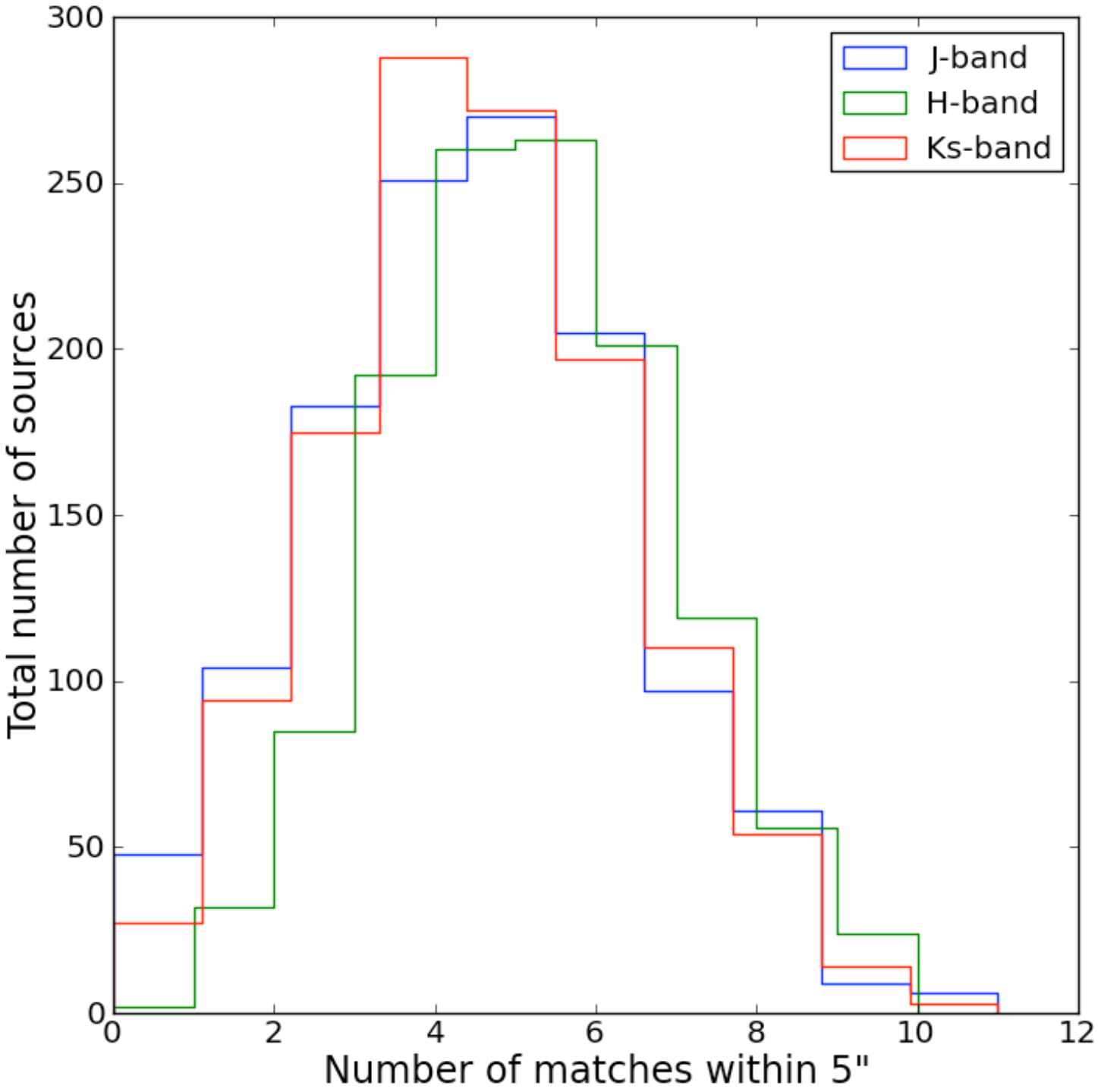
H-band



J-band






J-band
H-band
Ks-band
Total number of sources
Number of matches within 5"
0
50
100
150
200
250
300
0
2
4
6
8
10
12

Conclusion

- GBS fields are extremely crowded, follow-up is more difficult

  ➔multi-wavelength observations needed to disentangle reddening effects

- Upcoming data:
  - VVV's Ks-band variability
  - VPHAS+